

10/069485

PCT

From the INTERNATIONAL BUREAU

**NOTIFICATION OF THE RECORDING
OF A CHANGE**

(PCT Rule 92bis.1 and
Administrative Instructions, Section 422)

To:

KOLSTER OY AB
Iso Roobertinkatu 23
P.O. Box 148
FIN-00121 Helsinki
FINLANDE

Date of mailing (day/month/year) 02 May 2002 (02.05.02)	IMPORTANT NOTIFICATION
Applicant's or agent's file reference 2990516PC/nu	
International application No. PCT/FI00/00741	International filing date (day/month/year) 01 September 2000 (01.09.00)

1. The following indications appeared on record concerning:

☒ the applicant ☐ the inventor ☐ the agent ☐ the common representative

Name and Address NOKIA NETWORKS OY Keilalahdentie 4 FIN-02150 Espoo Finland	State of Nationality FI	State of Residence FI
	Telephone No.	
	Facsimile No.	
	Teleprinter No.	

2. The International Bureau hereby notifies the applicant that the following change has been recorded concerning:

☐ the person ☒ the name ☐ the address ☐ the nationality ☐ the residence

Name and Address NOKIA CORPORATION Keilalahdentie 4 FIN-02150 Espoo Finland	State of Nationality	State of Residence
	Telephone No.	
	Facsimile No.	
	Teleprinter No.	

3. Further observations, if necessary:

4. A copy of this notification has been sent to:

☒ the receiving Office ☐ the designated Offices concerned
☐ the International Searching Authority ☒ the elected Offices concerned
☐ the International Preliminary Examining Authority ☐ other:

The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland	Authorized officer Jaime LEITAO
Facsimile No.: (41-22) 740.14.35	Telephone No.: (41-22) 338.83.38

PATENT COOPERATION TREATY

PCT

NOTIFICATION OF ELECTION

(PCT Rule 61.2)

From the INTERNATIONAL BUREAU

To:

Commissioner
 US Department of Commerce
 United States Patent and Trademark
 Office, PCT
 2011 South Clark Place Room
 CP2/5C24
 Arlington, VA 22202
 ETATS-UNIS D'AMERIQUE
 in its capacity as elected Office

Date of mailing (day/month/year) 09 May 2001 (09.05.01)	
International application No. PCT/FI00/00741	Applicant's or agent's file reference 2990516PC/nu
International filing date (day/month/year) 01 September 2000 (01.09.00)	Priority date (day/month/year) 02 September 1999 (02.09.99)
Applicant ANDRESEN, Lars et al	

1. The designated Office is hereby notified of its election made:

☒ in the demand filed with the International Preliminary Examining Authority on:
 08 March 2001 (08.03.01)

☐ in a notice effecting later election filed with the International Bureau on:

2. The election ☒ was

☐ was not

made before the expiration of 19 months from the priority date or, where Rule 32 applies, within the time limit under Rule 32.2(b).

The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland Facsimile No.: (41-22) 740.14.35	Authorized officer Charlotte ENGER Telephone No.: (41-22) 338.83.38
--	--

PATENT COOPERATION TREATY

PCT

From the INTERNATIONAL BUREAU

NOTIFICATION OF THE RECORDING
OF A CHANGE(PCT Rule 92bis.1 and
Administrative Instructions, Section 422)

To:

KOLSTER OY AB
Iso Roobertinkatu 23
P.O. Box 148
FIN-00121 Helsinki
FINLANDE

Date of mailing (day/month/year) 02 May 2002 (02.05.02)	IMPORTANT NOTIFICATION
Applicant's or agent's file reference 2990516PC/nu	
International application No. PCT/FI00/00741	International filing date (day/month/year) 01 September 2000 (01.09.00)

1. The following indications appeared on record concerning:

☒ the applicant ☐ the inventor ☐ the agent ☐ the common representative

Name and Address

NOKIA NETWORKS OY
Keilalahdentie 4
FIN-02150 Espoo
Finland

State of Nationality

FI

State of Residence

FI

Telephone No.

Facsimile No.

Teleprinter No.

2. The International Bureau hereby notifies the applicant that the following change has been recorded concerning:

☐ the person ☒ the name ☐ the address ☐ the nationality ☐ the residence

Name and Address

NOKIA CORPORATION
Keilalahdentie 4
FIN-02150 Espoo
Finland

State of Nationality

State of Residence

Telephone No.

Facsimile No.

Teleprinter No.

3. Further observations, if necessary:

4. A copy of this notification has been sent to:

<input checked="" type="checkbox"/> the receiving Office	<input type="checkbox"/> the designated Offices concerned
<input type="checkbox"/> the International Searching Authority	<input checked="" type="checkbox"/> the elected Offices concerned
<input type="checkbox"/> the International Preliminary Examining Authority	<input type="checkbox"/> other:

The International Bureau of WIPO
34, chemin des Colombettes
1211 Geneva 20, Switzerland

Facsimile No.: (41-22) 740.14.35

Authorized officer

Jaime LEITAO

Telephone No.: (41-22) 338.83.38

PATENT COOPERATION TREATY

PCT

NOTIFICATION OF THE RECORDING
OF A CHANGE(PCT Rule 92bis.1 and
Administrative Instructions, Section 422)

From the INTERNATIONAL BUREAU

To:

KOLSTER OY AB
Iso Roobertinkatu 23
P.O. Box 148
FIN-00121 Helsinki
FINLANDEDate of mailing (day/month/year)
11 décembre 2001 (11.12.01)Applicant's or agent's file reference
2990516PC/nuInternational application No.
PCT/FI00/00741

IMPORTANT NOTIFICATION

International filing date (day/month/year)
01 septembre 2000 (01.09.00)

1. The following indications appeared on record concerning:

☒ the applicant ☒ the inventor ☐ the agent ☐ the common representative

Name and Address

ANDRESEN, Michael
Huldborgs Allé 32
DK-2800 Lyngby
Denmark

State of Nationality

DK

State of Residence

DK

Telephone No.

Facsimile No.

Teleprinter No.

2. The International Bureau hereby notifies the applicant that the following change has been recorded concerning:

☐ the person ☒ the name ☐ the address ☐ the nationality ☐ the residence

Name and Address

ANDERSEN, Michael
Huldborgs Allé 32
DK-2800 Lyngby
Denmark

State of Nationality

DK

State of Residence

DK

Telephone No.

Facsimile No.

Teleprinter No.

3. Further observations, if necessary:

4. A copy of this notification has been sent to:

☒ the receiving Office ☐ the designated Offices concerned
☐ the International Searching Authority ☒ the elected Offices concerned
☒ the International Preliminary Examining Authority ☐ other:The International Bureau of WIPO
34, chemin des Colombettes
1211 Geneva 20, Switzerland

Facsimile No.: (41-22) 740.14.35

Authorized officer

Catherine MASSETTI

Telephone No.: (41-22) 338.83.38

17 DEC 2001

14

Applicant's or agent's file reference 2990516PC/or	FOR FURTHER ACTION See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)	
International application No. PCT/FI00/00741	International filing date (<i>day/month/year</i>) 01.09.2000	Priority date (<i>day/month/year</i>) 02.09.1999
International Patent Classification (IPC) or national classification and IPC ⁷ H04M 17/00		
Applicant Nokia Networks Oy et al		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.

2. This REPORT consists of a total of 3 sheets, including this cover sheet.

☐ This report is also accompanied by ANNEXES, i.e., sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

These annexes consist of a total of _____ sheets.

3. This report contains indications relating to the following items:

- I ☒ Basis of the report
- II ☐ Priority
- III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- IV ☐ Lack of unity of invention
- V ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- VI ☐ Certain documents cited
- VII ☐ Certain defects in the international application
- VIII ☐ Certain observations on the international application

Date of submission of the demand 08.03.2001	Date of completion of this report 05.12.2001
Name and mailing address of the IPEA/SE Patent- och registreringsverket Box 5055 S-102 42 STOCKHOLM Facsimile No. 08-667 72 88	Authorized officer Leif Vingård / JA A Telephone No. 08-782 25 00

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.

PCT/FI00/00741

I. Basis of the report

1. With regard to the **elements** of the international application:*

- ☒ the international application as originally filed
- ☐ the description:
pages _____, as originally filed
pages _____, filed with the demand
pages _____, filed with the letter of _____
- ☐ the claims:
pages _____, as originally filed
pages _____, as amended (together with any statement) under article 19
pages _____, filed with the demand
pages _____, filed with the letter of _____
- ☐ the drawings:
pages _____, as originally filed
pages _____, filed with the demand
pages _____, filed with the letter of _____
- ☐ the sequence listing part of the description:
pages _____, as originally filed
pages _____, filed with the demand
pages _____, filed with the letter of _____

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language _____ which is:

- ☐ the language of a translation furnished for the purposes of international search (under Rule 23.1(b)).
- ☐ the language of publication of the international application (under Rule 48.3(b)).
- ☐ the language of the translation furnished for the purposes of international preliminary examination (under Rules 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in written form.
- ☐ filed together with the international application in computer readable form.
- ☐ furnished subsequently to this Authority in written form.
- ☐ furnished subsequently to this Authority in computer readable form.
- ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. ☐ The amendments have resulted in the cancellation of:

- ☐ the description, pages _____
- ☐ the claims, Nos. _____
- ☐ the drawings, sheet/fig _____

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2 (c)).**

* Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are annexed to this report since they do not contain amendments (Rules 70.16 and 70.17).

** Any replacement sheet containing such amendments must be referred to under item I and annexed to this report.

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.

PCT/FI00/00741

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**1. Statement**

Novelty (N)	Claims	<u>1-11</u>	YES
	Claims		NO
Inventive step (IS)	Claims	<u>1-11</u>	YES
	Claims		NO
Industrial applicability (IA)	Claims	<u>1-11</u>	YES
	Claims		NO

2. Citations and explanations (Rule 70.7)

This report is based on the claims as originally filed.

EP 0860975 A2 discloses a telecommunications service having one attribute, the value of which is subscriber-specific. The document refers to a method of determining fees for chargeable telecommunications services, where a counting device is used to calculate the amount of charges accumulated by an individual customer during a predetermined billing period. The method is characterized in that after exceeding a threshold value of the accumulated amount of charges, which can be individually established for the customers, a low-fee, preferably a no-fee usage of the telecommunications services is made available to the customer. EP 0860975 A2 does not disclose that different subscribers may have different attributes or that a subscriber may have more than one attribute. Thus, EP 0860975 A2 fails to disclose two different profiles, each defining at least one attribute as claimed in the present application.

EP 0860975 A2 does not reveal a method for customizing a prepaid service in a telecommunications system, a telecommunications system offering prepaid subscriber services or a network element in a telecommunications system as defined in the present application. EP 0860975 A2 therefore represents the prior art. The claimed inventions stated in claims 1-11 are not considered to be anticipated by this document.

According to the arguments stated above, the inventions claimed in claims 1-11 are novel, considered to involve an inventive step and have industrial applicability.

PCT REQUEST

Original (for SUBMISSION) - printed on 01.09.2000 12:26:04 PM

2990516PC/nu

0	For receiving Office use only	
0-1	International Application No.	PCT/FI 00 / 00741
0-2	International Filing Date	01 SEP 2000 (01-09-2000)
0-3	Name of receiving Office and "PCT International Application"	The Finnish Patent Office PCT International Application
0-4	Form - PCT/RO/101 PCT Request Prepared using	PCT-EASY Version 2.91 (updated 01.07.2000)
0-5	Petition The undersigned requests that the present international application be processed according to the Patent Cooperation Treaty	
0-6	Receiving Office (specified by the applicant)	National Board of Patents and Registration (Finland) (RO/FI)
0-7	Applicant's or agent's file reference	2990516PC/nu
I	Title of invention	CUSTOMIZING PREPAID SERVICE
II	Applicant	
II-1	This person is:	applicant only
II-2	Applicant for	all designated States except US
II-4	Name	NOKIA NETWORKS OY
II-5	Address:	Keilalahdentie 4 FIN-02150 Espoo Finland
II-6	State of nationality	FI
II-7	State of residence	FI
III-1	Applicant and/or inventor	
III-1-1	This person is:	applicant and inventor
III-1-2	Applicant for	US only
III-1-4	Name (LAST, First)	ANDRESEN, Lars
III-1-5	Address:	Judithsvej 15 st tv DK-2900 Hellerup Denmark
III-1-6	State of nationality	DK
III-1-7	State of residence	DK
III-2	Applicant and/or inventor	
III-2-1	This person is:	applicant and inventor
III-2-2	Applicant for	US only
III-2-4	Name (LAST, First)	ANDRESEN, Michael
III-2-5	Address:	Huldbergs Allé 32 DK-2800 Lyngby Denmark
III-2-6	State of nationality	DK
III-2-7	State of residence	DK

PCT REQUEST

2990516PC/nu

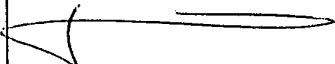
Original (for SUBMISSION) - printed on 01.09.2000 12:26:04 PM

IV-1	Agent or common representative; or address for correspondence The person identified below is hereby/has been appointed to act on behalf of the applicant(s) before the competent International Authorities as:	agent
IV-1-1	Name	KOLSTER OY AB
IV-1-2	Address:	Iso Roobertinkatu 23 P.O. Box 148 FIN-00121 Helsinki Finland
IV-1-3	Telephone No.	358 9 618 821
IV-1-4	Facsimile No.	358 9 602 244
IV-1-5	e-mail	kolster@kolster.fi
V	Designation of States	
V-1	Regional Patent (other kinds of protection or treatment, if any, are specified between parentheses after the designation(s) concerned)	AP: GH GM KE LS MW MZ SD SL SZ TZ UG ZW and any other State which is a Contracting State of the Harare Protocol and of the PCT EA: AM AZ BY KG KZ MD RU TJ TM and any other State which is a Contracting State of the Eurasian Patent Convention and of the PCT EP: AT BE CH&LI CY DE DK ES FI FR GB GR IE IT LU MC NL PT SE and any other State which is a Contracting State of the European Patent Convention and of the PCT OA: BF BJ CF CG CI CM GA GN GW ML MR NE SN TD TG and any other State which is a member State of OAPI and a Contracting State of the PCT
V-2	National Patent (other kinds of protection or treatment, if any, are specified between parentheses after the designation(s) concerned)	AE AG AL AM AT (patent and utility model) AU AZ BA BB BG BR BY BZ CA CH&LI CN CR CU CZ (patent and utility model) DE (patent and utility model) DK (patent and utility model) DM DZ EE (patent and utility model) ES FI (patent and utility model) GB GD GE GH GM HR HU ID IL IN IS JP KE KG KP KR (patent and utility model) KZ LC LK LR LS LT LU LV MA MD MG MK MN MW MX MZ NO NZ PL PT RO RU SD SE SG SI SK (patent and utility model) SL TJ TM TR TT TZ UA UG US UZ VN YU ZA ZW

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2990516PC/nu

V-5	Precautionary Designation Statement In addition to the designations made under items V-1, V-2 and V-3, the applicant also makes under Rule 4.9(b) all designations which would be permitted under the PCT except any designation(s) of the State(s) indicated under item V-6 below. The applicant declares that those additional designations are subject to confirmation and that any designation which is not confirmed before the expiration of 15 months from the priority date is to be regarded as withdrawn by the applicant at the expiration of that time limit.	
V-6	Exclusion(s) from precautionary designations	NONE
VI-1	Priority claim of earlier national application	
VI-1-1	Filing date	02 September 1999 (02.09.1999)
VI-1-2	Number	19991873
VI-1-3	Country	FI
VI-2	Priority document request The receiving Office is requested to prepare and transmit to the International Bureau a certified copy of the earlier application(s) identified above as item(s):	VI-1
VII-1	International Searching Authority Chosen	Swedish Patent Office (ISA/SE)
VIII	Check list	number of sheets electronic file(s) attached
VIII-1	Request	4 -
VIII-2	Description	8 -
VIII-3	Claims	2 -
VIII-4	Abstract	1 2990516p.txt
VIII-5	Drawings	2 -
VIII-7	TOTAL	17
VIII	Accompanying items	paper document(s) attached electronic file(s) attached
VIII-8	Fee calculation sheet	✓ -
VIII-10	Copy of general power of attorney	✓ -
VIII-16	PCT-EASY diskette	- diskette
VIII-18	Figure of the drawings which should accompany the abstract	2
VIII-19	Language of filing of the international application	English
IX-1	Signature of applicant or agent	
IX-1-1	Name	KOLSTER OY AB Tapio Valkeiskangas

FOR RECEIVING OFFICE USE ONLY

10-1	Date of actual receipt of the purported international application	01 SEP 2000 (01 -09- 2000)
10-2	Drawings:	
10-2-1	Received	
10-2-2	Not received	

PCT REQUEST

2990516PC/nu

Original (for SUBMISSION) - printed on 01.09.2000 12:26:04 PM

10-3	Corrected date of actual receipt due to later but timely received papers or drawings completing the purported international application	
10-4	Date of timely receipt of the required corrections under PCT Article 11(2)	
10-5	International Searching Authority	ISA/SE
10-6	Transmittal of search copy delayed until search fee is paid	

FOR INTERNATIONAL BUREAU USE ONLY

11-1	Date of receipt of the record copy by the International Bureau	
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(19) World Intellectual Property Organization
International Bureau(43) International Publication Date
15 March 2001 (15.03.2001)

PCT

(10) International Publication Number
WO 01/19068 A1(51) International Patent Classification⁷: H04M 17/00[DK/DK]; Judithsvej 15 st tv, DK-2900 Hellerup (DK).
ANDRESEN, Michael [DK/DK]; Huldbergs Allé 32,
DK-2800 Lyngby (DK).

(21) International Application Number: PCT/FI00/00741

(22) International Filing Date:
1 September 2000 (01.09.2000)(74) Agent: KOLSTER OY AB; Iso Roobertinkatu 23, P.O.
Box 148, FIN-00121 Helsinki (FI).

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
19991873 2 September 1999 (02.09.1999) FI(81) Designated States (*national*): AE, AG, AL, AM, AT, AT
(utility model), AU, AZ, BA, BB, BG, BR, BY, BZ, CA,
CH, CN, CR, CU, CZ, CZ (utility model), DE, DE (utility
model), DK, DK (utility model), DM, DZ, EE, EE (utility
model), ES, FI, FI (utility model), GB, GD, GE, GH, GM,
HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KR (utility
model), KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG,
MK, MN, MW, MX, MZ, NO, NZ, PL, PT, RO, RU, SD,
SE, SG, SI, SK, SK (utility model), SL, TJ, TM, TR, TT,
TZ, UA, UG, US, UZ, VN, YU, ZA, ZW.(71) Applicant (*for all designated States except US*): NOKIA
NETWORKS OY [FI/FI]; Keilalahdentie 4, FIN-02150
Espoo (FI).(84) Designated States (*regional*): ARIPO patent (GH, GM,
KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW), Eurasian
patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European
patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE,

(72) Inventors; and

(75) Inventors/Applicants (*for US only*): ANDRESEN, Lars

[Continued on next page]

(54) Title: CUSTOMIZING PREPAID SERVICE

	Gold	Silver	Economy
DF Bonus	0,1	0	0
X1	1	1	1
X2	1	1	0,9
X3	1	0,5	0
X4	1	0,4	0
X5	1	0	0
Max Acc	None	None	500
EF A	Later than old or current	Old	Current
T3	365	1	0
DT2	-335	-30	-15
DT4	-335	150	45
DT5	-365	180	65
Max time	None	None	30

(57) Abstract: In order to provide possibility to customize a prepaid service in a telecommunications system, at least two different profiles (Gold, Silver, Economy) are defined, each profile defining at least one attribute (DF, EF) for the prepaid service. A subscriber's subscriber information is associated with one profile and the prepaid service is provided to the subscriber as indicated by the attribute defined in the profile associated with the subscriber's information.

WO 01/19068 A1



IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

Published:

- *With international search report.*
- *Before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments.*

Customizing pr paid service

Background of the invention

The present invention relates to a method and equipment for customizing prepaid service.

5 In telecommunications systems, such as the pan-European digital mobile communications system GSM (Global System for Mobile Communications), the use of prepaid SIM (Subscriber Identity Module) cards is increasing. Prepaid SIM cards relieve the network service providers of credit losses. They enable parents to set an upper limit for the telephone bill beforehand. As a
10 third benefit, they enable roaming subscribers to pay their local calls with local tariffs, whereas the use of a SIM card of their home service provider results in paying international tariffs to their home network and back.

Usually service providers allow the subscribers to call an Interactive Voice Response (IVR) service through which the service subscribers can
15 check their account balance and add more money to their accounts. This money adding is called recharge. Instead of calling the IVR it is possible to also call to the operator's service number. It is also possible to check the account balance and recharge via the SMAP, which is an Internet-based user interface. Recharge is carried out by means of vouchers. Some service pro-
20 viders sell different types of vouchers, which differ from each other e.g. in the number of call units and expiry time.

One problem with the current prepaid solution is that the attributes of the prepaid service are the same to all subscribers - or at least to all subscribers using the same kinds of vouchers since the attributes are connected
25 with the voucher. So the operators are not able to offer a customized prepaid service. One example of a prepaid service attribute is how the prepaid subscription data is updated during recharge.

Disclosure of the invention

The object of the invention is to overcome the above problem. The
30 object of the invention is achieved with a method, a system and a network element which are characterized in that what disclosed in the independent claims. The preferred embodiments of the invention are set forth in the dependent claims.

The invention is based on defining different subscriber profiles having different attributes and associating subscriber information with an indication of which profile to use with this subscriber.

The advantages of the invention are that the service providers can
5 customize their prepaid service without changing the basic service structure by giving different profiles to the subscribers. Thus customizing and changing customized services are very easy.

In one embodiment of the invention the attribute is a deposit function. A further advantage of this embodiment is that other features than the
10 voucher value may also be taken into account when calculating a new credit.

In still another embodiment of the invention the attribute is an expiry function. The further advantage of this embodiment is that other features than the voucher validity time may also be taken into account when calculating new expiry dates.

15 **Brief description of the figures**

The invention will be described in further detail in the following by means of preferred embodiments with reference to the accompanying drawings, in which

Figure 1 is a block diagram showing some relevant network ele-
20 ments;

Figure 2 is a block diagram illustrating different profiles according to a first preferred embodiment;

Figure 3 is a flow chart illustrating subscriber provisioning; and

Figure 4 is a flow chart illustrating the functionality of the invention
25 during recharge.

Detailed description of the invention

Figure 1 is a block diagram of a telecommunications system S equipped with an arrangement according to a preferred embodiment of the invention. The telecommunications network is assumed to be a public land mobile network PLMN yet without limiting the invention to that kind of particular
30 network. The invention can be used in any telecommunications systems, where prepaid subscribers have subscription information stored in the system. A prepaid subscriber refers here to a subscriber using prepaid subscription, i.e. a subscriber who has paid in advance. The embodiment illustrated in Figure 1 makes use of Intelligent Network technology. An intelligent network IN is
35

able to provide a subscriber of a telecommunications network, such as a wired network or a mobile telephone network, with a plurality of services. An example of such an intelligent network is described in recommendations of the ITU-T Q-1200 series, of which Q-1210 to Q-1219 define a set of features known as CS-1 (Capability Set 1), and correspondingly, Q-1220 to Q-1229 define a set of features CS-2. The invention and its background will be described by the terminology of recommendation ETS 300 374-1 CoreINAP, but the invention can also be employed in intelligent networks implemented according to other intelligent network standards.

Figure 1 shows some elements of an intelligent network which are relevant to the understanding of the invention, such as what are known as intelligent peripherals IP. Usually an IP is associated with a specialized resource function which is an interface for network mechanisms associated with interaction with a subscriber. Therefore an IP comprises usually e.g. more advanced speech handling functions than do exchanges in general. The IVR application is usually located in the IP. The IVR application, also called the PrePaid service IVR application, is an interactive voice response application that allows the subscriber to add money to (deposit, recharge) his PrePaid SIM account by entering the number of a prepaid voucher. The IP is connected to an SSP using for example ISUP (ISDN User Part) signalling and one or more voice transports.

The SSP (Service Switching Point) is a network element performing a service switching function (SSF). The SSP may be a mobile service switching centre MSC, which includes the SSF. The SSF is an interface between a conventional call control function CCF and the service control function SCF of an intelligent network. The network element performing the SCF is called a service control point SCP. An intelligent network service is produced by the service switching point SSP inquiring instructions from the service control point SCP by means of messages to be transmitted across the SSP/SCP interface upon the encounter of detection points associated with the service. In association with an intelligent network service, a service program is started at the service control point SCP, the operation of the program determining the messages transmitted by the SCP to the SSP at each stage of a call. However, usually the SCP is not used in the service logic of the Prepaid SIM IVR recharge application, i.e. calls to the IVR are routed by the CCF directly to the

IVR on the basis of the service number which the subscriber has dialled in order to recharge.

In the example illustrated in Figure 1, the prepaid subscriber information and information about vouchers are in a database located in a service management point SMP. Alternatively the information may be located in different databases and/or in some other network element, like a home location register HLR. The IVR interfaces the SMP database through a service management interface SMI. The SMP and the IP may be connected e.g. through a local area network (LAN) using the TCP/IP (Transmission Control Protocol/Internet Protocol). The connection between the IP and the SMP, illustrated by a dashed line, represents only management connection without any signalling connection, e.g. functions used to calculate the expiry time or times during recharge.

In a first preferred embodiment of the invention, predefined profiles are located also in the SMP and each subscriber's subscriber information comprises a profile identifier indicating which profile to use. Thus many subscribers can have the same profile but each subscriber has only one profile in the first preferred embodiment. A prepaid profile is a profile defining at least one of the following attributes: deposit function, expiry function, account maximum, maximum validity period and expiry state handling function. The deposit function defines how the new prepaid credit is calculated. The expiry function defines how the validity of the prepaid credit is calculated based e.g. on current validity, recharge amount, voucher used for recharge, etc. In those embodiments where the prepaid expiry handler has different states for progressively limiting the possibilities of the subscriber over time when no recharge is performed, the expiry state handling function may define for each state when the subscriber is in that state. The expiry state handling function may also define how and where to route calls in different situations, e.g. in different states. The expiry handling function or parts of it may also be included in the expiry function.

The expiry handling function may also be included in the expiry function.

The service management access point SMAP provides some selected users, such as service providers and network operators, with access to the service data of the service management point SMP through a public telephone network, such as the PSTN or the ISDN, a cellular radio network (such

as the GSM) or a public data network (X.25, the Internet) and an open interface. The SMAP interacts directly with the SMP. Furthermore, the SMAP can provide access to a network element of another telecommunications network, such as the home location register HLR comprising data related to subscriber information and telecommunications services. Functionally, the SMAP comprises a service management access function. The profiles can be defined and definitions changed via the SMAP. The SMAP is described in greater detail in PCT patent application WO98/41038 which is incorporated herein by reference.

Network operators and service providers are nowadays separated. A service provider buys the necessary bearer services from a network operator. A network operator may also be a service provider. An operator may also have multiple service providers.

Figure 2 shows an example of different profiles according to the first preferred embodiment of the invention. In the first preferred embodiment of the invention, prepaid services are built with prepaid expiry having different kinds of time limits. In the first preferred embodiment, the prepaid subscriber who has activated his subscription is in one of the five different subscription states, the states being active, near the credit expiry, credit expired, near subscription expiry and subscription expired. The state depends on how long has passed since the subscriber last time recharged. When the credit expires, the credit of a prepaid account is no longer valid. When the subscription expires, the subscription is no longer valid and the subscription is deactivated. The "near states" are states during which an announcement is given indicating what is going to happen soon if the account is not recharged. The prepaid expiry is described in greater detail in Finnish patent application FI990937 which is incorporated herein by reference.

Referring to Figure 2, a service provider has defined three different profiles: a Gold Profile in which the credit never expires and at each recharge a bonus is given; a Silver profile with a long credit validity and an Economy profile where the prepaid credit must be recharged frequently in order not to lose existing credit.

In the first preferred embodiment of the invention, the service attributes to be defined are a deposit function DF and an expiry function EF. In the first embodiment of the invention, it is assumed for the sake of clarity that the same basic function is used in every profile. However, it is possible to define

different functions for different profiles. In the first preferred embodiment of the invention, the deposit function is:

$$\text{new credit} = X_n \cdot \text{old credit} + (1 + \text{bonus}) \cdot \text{voucher value}$$

where X_n relates to what state the subscriber is in, e.g. X_1 is used

- 5 when the subscriber is in the active state, X_2 when the state is "near credit expiry", X_3 in state "credit expired", X_4 "near subscription expiry" and X_5 in state "Subscription expired".

- 10 In the first preferred embodiment a max acc, i.e. maximum account credit, is also used. Thus, if a recharge results in a credit greater than the maximum account credit, the recharge is not accepted and the voucher remains unused. In some other embodiments of the invention when the new credit exceeds the max acc, the new credit may also be set for example to the maximum value.

- 15 In the first preferred embodiment of the invention, the expiry function calculates the dates as follows:

$$\text{credit expiry date} = A + \text{credit period of a voucher} + T_3$$

- 20 where A defines whether to use the current date or the old credit expiry date, T_3 allows adjusting length period before the credit expires. For example in the gold profile illustrated in Figure 2, the credit will expire when the subscription expires.

The other dates are calculated on the basis of credit expiry date in the first preferred embodiment by formula:

$$\text{date} = \text{credit expiry date} + DT_n$$

- 25 where DT_n relates to time differences between credit expiry date and other dates. DT_2 is used to calculate the date when the state "near credit expiry" is entered, DT_4 relates to the state "near subscription expiry" and DT_5 "subscription expiry".

- 30 In the first preferred embodiment of the invention, a max time, i.e. a maximum validity period, is also used. If a recharge results in the number of days between recharge day and the credit expiry date exceeding the maximum validity period, then the new credit expiry date will be set to the current date plus the maximum validity period.

- 35 The maximum account credit and the maximum validity period values may be set into the profile definitions as in Figure 2 or the profile definitions may indicate that such attributes are used and the actual values are in the subscriber specific information.

The functions described above in Figure 2 are only examples and meant to illustrate the invention. The service provider may compose different kinds of functions using different kinds of variables, constants, voucher properties, etc.

5 Figure 3 is a flow chart illustrating subscriber provisioning in the first preferred embodiment of the invention. In step 301 a subscriber number MSISDN is given to a subscriber, and in step 302 a profile is associated with the MSISDN in the subscriber information. The profile is identified with an identifier which can for example be a name like Gold, Silver and Economy in
10 the example illustrated in Figure 2. After that, in the first preferred embodiment of the invention, a subscription expiry date is calculated in step 303 using the value of DT5 of Figure 2 defined in the profile. Then the subscriber information (including the MSISDN, the profile identifier and the subscription expiry date) is stored in step 304 in the SMP and the subscriber can activate his sub-
15 scription by a recharge.

 Figure 4 is a flow chart illustrating a recharge in the first preferred embodiment of the invention. It is assumed, for the sake of clarity, that the new voucher is valid, all necessary information will be obtained and the calling subscriber is a prepaid subscriber, otherwise he cannot recharge. Another as-
20 sumption, made here, is that the subscriber recharges via the IVR yet without limiting the invention to that particular way to recharge. The invention may be used with other recharge media as well.

 Referring to Figure 4, a subscriber has bought a voucher from a shop, called the IVR and selected to deposit the voucher. It is assumed that
25 the IVR checks at the beginning of the call, if the caller is a prepaid subscriber, and if not, then the call is disconnected or connected to customer service. Figure 4 begins in step 401, where the IVR is prompting the subscriber for a voucher identification ID. The voucher identification number ID is received in step 402. The validity of the voucher is checked (not shown in Figure 4) and
30 after that, in step 403, the IVR obtains the values of the voucher, e.g. the value to deposit and the credit period used by the deposit function DF and the expiry function EF described in greater detail in Figure 2. The IVR then obtains the subscriber's current credit and profile in step 404. Then the IVR analyzes the profile in step 405 in order to find out what information it needs to update
35 subscriber information. In the first preferred information the necessary information is the current state so that the right value for Xn can be selected. In

step 406 the IVR obtains the necessary information and then the new credit is calculated in step 407 with the deposit function values indicated in the profile. After that the expiry dates are calculated in step 408 with expiry function values indicated in the profile. The updating is then ready and the subscriber is given, in step 409, an audio message telling the new credit and the credit expiry date.

The steps have not been set out in an absolute time sequence in Figures 3 and 4. Some of the above steps may take place simultaneously or in a different order, for example. Some steps may also be skipped, like steps 303 and 408 in embodiments where the expiry is not used. Other steps not shown in figures 3 and 4 may also take place between the steps stated above.

In some other embodiments a default profile may be used. It is automatically associated during provisioning with the subscriber information if no other profile is indicated, or the attributes of the default profile are used during recharge in cases when the subscriber has no profile associated directly with the subscriber information.

It is also possible to add the values of attributes, i.e. profile definitions, to the subscriber information during subscriber provisioning and this way associate the subscriber information with a profile. In these embodiments the subscriber information does not comprise a profile identifier but a whole profile definitions with values for attributes. However, separate profile definitions are more preferable, since they are less laborious and less susceptible to errors. A further advantage of using separate profile definitions instead of adding profile definitions to each subscriber's subscriber information is that a lot less memory is needed and changing profile definitions is much easier.

The present invention can be implemented in the existing network elements. They all have processors and a memory with which the inventive functionality described above may be implemented. The functions described above may be located in one network element or some of them may be in one element and the others in other elements regardless of how they are located in the examples used to illustrate the invention.

The accompanying drawings and the description pertaining to them are only intended to illustrate the present invention. Different variations and modifications to the invention will be apparent to those skilled in the art, without departing from the scope and spirit of the invention defined in the appended claims.

Claims

1. A method for customizing a prepaid service in a telecommunications system, the method comprising the steps of:

maintaining subscriber information on at least one prepaid subscriber,

characterized by

defining at least two different profiles, each profile defining at least one attribute for the prepaid service;

associating the subscriber's subscriber information with one profile,

providing the prepaid service to the subscriber as indicated by the attribute defined in the profile associated with the subscriber's information.

2. A method as claimed in claim 1, characterized by carrying out the associating during subscription provisioning.

3. A method as claimed in claim 1 or 2, characterized by the method further comprising the step of updating subscriber information during recharge as defined in the profile.

4. A method as claimed in claims 1, 2 or 3, characterized by the attribute being a deposit function defining how to calculate the credit during recharge.

5. A method as claimed in claims 1, 2 or 3, characterized by the attribute being an expiry function defining how to calculate the validity time of the prepaid credit.

6. A method as claimed in claims 1, 2 or 3, characterized by the attribute being an expiry state handling function defining how the possibilities of a subscriber are limited over time when no recharge is carried out.

7. A telecommunications system (S) offering prepaid subscription services, the system comprising at least one database (SMP) having subscriber information on at least one prepaid subscriber, characterized in that

the system (S) is arranged to maintain at least two different profiles, each profile defining at least one attribute for the prepaid service; to associate the subscriber's subscriber information with one profile; and to provide a prepaid service to the subscriber as indicated by the attribute defined in the associated profile.

8. A telecommunications system (S) as claimed in claim 7, characterized in that the attribute is a deposit function and the system (S) is

further arranged to calculate a subscriber's credit according to the deposit function defined in the profile associated with the subscriber's subscriber information.

9. A telecommunications system (S) as claimed in claim 7, characterized in that the attribute is an expiry function and the system (S) is further arranged to calculate a subscriber's credit validity according to the expiry function defined in the profile associated with the subscriber's subscriber information.

10. A telecommunications system (S) as claimed in claim 7, characterized in that the attribute is an expiry handling function and the system (S) is further arranged to limit the possibilities of a subscriber over time according to the expiry handling function defined in the profile associated with the subscriber's subscriber information.

11. A network element (IP) in a telecommunications system, where subscribers of the system can prepay for their calls by recharging their accounts via vouchers, the element including a database or a connection to a database (SMP) having subscriber information of prepaid subscribers,

characterized in that

the network element (IP) is arranged to have access to profile definitions, each profile defining at least one attribute for the prepaid service, and to update the subscriber information during recharge according to a profile associated with the recharging subscriber's subscriber information.

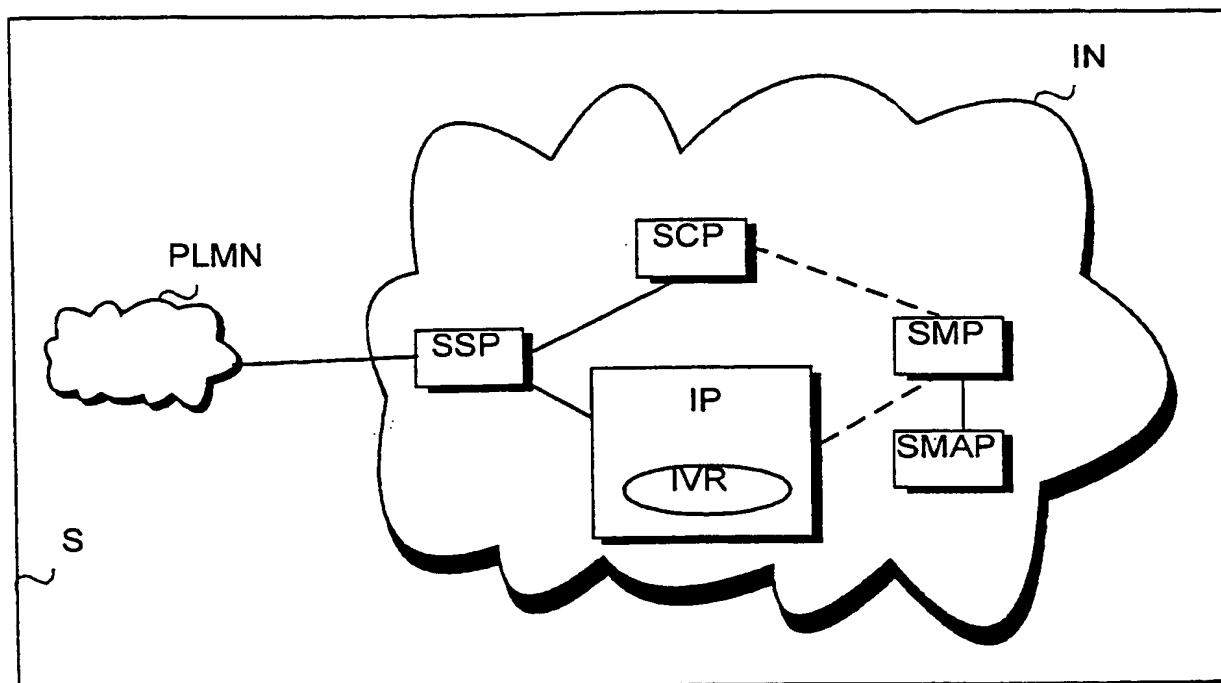
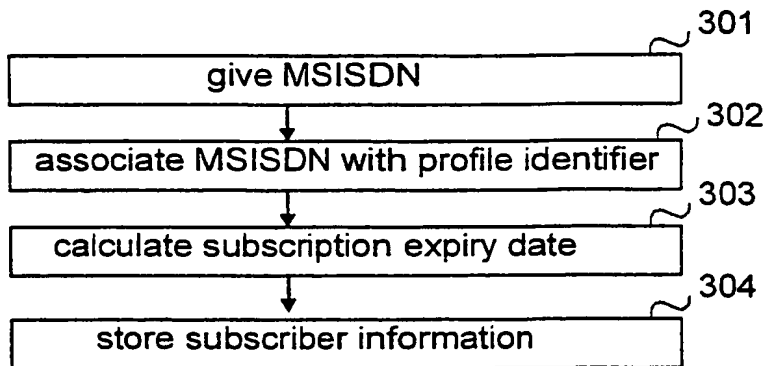
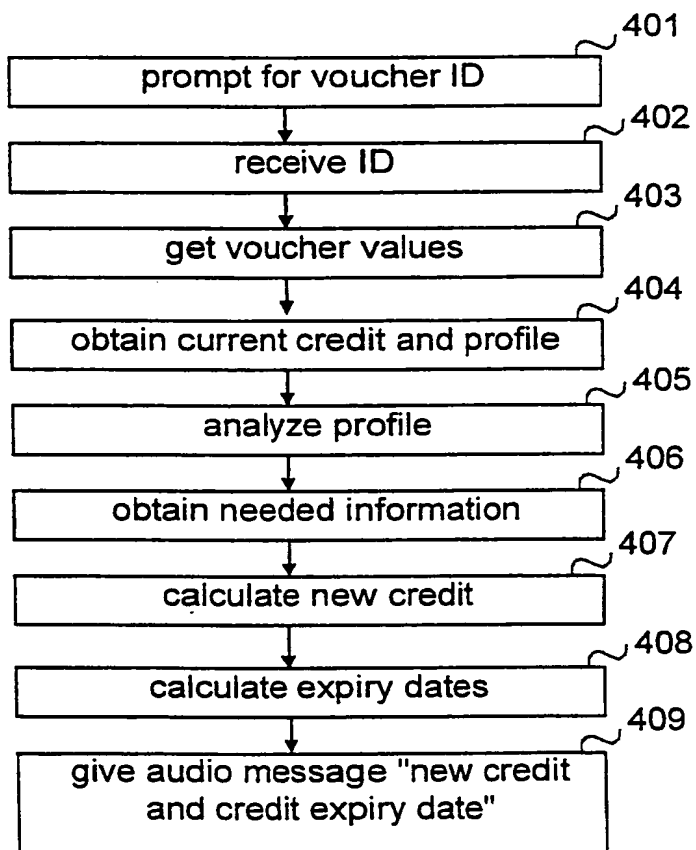


FIG. 1

		Gold	Silver	Economy
DF	Bonus	0,1	0	0
	X1	1	1	1
	X2	1	1	0,9
	X3	1	0,5	0
	X4	1	0,4	0
	X5	1	0	0
	Max Acc	None	None	500
EF	A	Later than old or current	Old	Current
	T3	365	1	0
	DT2	-335	-30	-15
	DT4	-335	150	45
	DT5	-365	180	65
	Max time	None	None	30

FIG.2

2/2

*FIG. 3**FIG. 4*

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INTERNATIONAL SEARCH REPORT

International application No.

PCT/FI 00/00741

A. CLASSIFICATION OF SUBJECT MATTER

IPC7: H04M 17/00

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC7: H04M, H04Q

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE,DK,FI,NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 0860975 A2 (ALCATEL ALSTHOM COMPAGNIE GENERALE D'ELECTRICITE), 26 August 1998 (26.08.98), column 1, line 33 - column 3, line 44	1,7
A	--	2-6,8-11
A	WO 9918713 A1 (TELEFONAKTIEBOLAGET LM ERICSSON (PUBL)), 15 April 1999 (15.04.99), page 4, line 22 - page 6, line 36	1-11
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☐ Further documents are listed in the continuation of Box C. ☒ See patent family annex.

* Special categories of cited documents:	"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"A" document defining the general state of the art which is not considered to be of particular relevance	"X" document of particular relevance: the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"E" earlier application or patent but published on or after the international filing date	"Y" document of particular relevance: the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
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"P" document published prior to the international filing date but later than the priority date claimed	

Date of the actual completion of the international search	Date of mailing of the international search report
5 January 2001	09-01-2001
Name and mailing address of the ISA/ Swedish Patent Office Box 5055, S-102 42 STOCKHOLM Facsimile No. +46 8 666 02 86	Authorized officer Jenny Eriksson/JAN Telephone No. +46 8 782 25 00

INTERNATIONAL SEARCH REPORT
Information on patent family members

04/12/00

International application No.

PCT/FI 00/00741

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